Undergraduate Student Research Project (USRP)
Administered by Universities Space Research Association
Cooperative Agreement
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PROJECT DESCRIPTION

First implemented in 2001, USRP provides degree-related internships mentored by NASA scientists and engineers to talented undergraduate students pursuing academic degrees that align with NASA's critical workforce competency needs. USRP internships are stipend-paid, full-time, fully immersive research and engineering experiences available in spring, summer, and fall at 12 NASA centers and research facilities. USRP internships are open to U.S. Citizens with a cumulative GPA of 3.0, currently enrolled full-time in an undergraduate engineering and/or hard-science degree program and classified as a sophomore or above by the start of the internship. Fall and spring USRP internship sessions are 15 weeks long while the summer session is 10 weeks. Interns work side-by-side with NASA engineers and scientists performing activities ranging from basic research and development to mission operations. Interns complete a technical report documenting their work at the conclusion of the experience. Following are the USRP stated goals:

a) Provide an academic and career nexus, through internships that facilitate the pursuit of graduate study in STEM, and/or employment in the aerospace and aeronautics workforce.

b) Attract undergraduate students from the widest array of backgrounds, who are fully representative of U.S. undergraduate students enrolled in STEM majors and provide them with hands-on, challenging technical experiences that enhance their academic preparation.

c) Build a national STEM pipeline from existing NASA Pre-College Education activities to other NASA Higher Education options (Push-Pull) to encourage and facilitate student interest in future professional opportunities with NASA and its partner organizations.

d) Extend and strengthen NASA's commitment to educational excellence and university research and to highlight the critical need to increase the nation's undergraduate and graduate STEM skill base.

USRP 2008 PROJECT GOALS

1. Make USRP internship opportunities available year-round.
2. Generate a minimum of 300 student internships.
3. Create a 100% web-based application process to encourage more qualified candidates to apply.
4. Improve efficiencies in selection, offers, and acceptance processes.
5. Select a geographically and institutionally diverse group of interns from a wide array of backgrounds, who are fully representative of U. S. undergraduate students enrolled in STEM majors.
6. Strengthen evaluation instruments to capture more detailed information on project outcomes.

PROJECT BENEFIT TO OUTCOME (1,2, OR 3)

USRP directly addresses NASA Higher Education Outcome 1 and supports NASA Higher Education Outcome 2 of the *NASA Education Strategic Plan*. These outcomes commit the education office to fund programs which (1) contribute to the development of the STEM workforce and (2) attract and retain students in STEM disciplines needed to achieve NASA strategic goals. USRP most directly contributes to NASA Higher Education Outcome 1.2 defined as "Provide NASA competency-building education and research opportunities to individuals to develop qualified undergraduate and graduate students who are prepared for employment in STEM disciplines at NASA, industry, and higher education."

USRP is NASA's largest fully-immersive experiential program for undergraduate STEM students and the only agency-wide internship project providing experiences spring, summer, and fall. Research shows that one of the best methods of maximizing retention within a field of study is to incorporate experiential opportunities into the traditional course of study. Benefits in terms of retention to graduation, increased capability at graduation, pursuit of advanced degrees, and retention within the career field are well documented. For example, a data set recently presented at the 2007 ASEE Annual Conference showed that undergraduate aerospace engineering students who participated in co-op or internship were retained within the aerospace field at rate 30% higher than students who did not (85% vs. 55%).

The need for increased STEM graduates in the U.S. is well documented. This need is dramatically magnified in the aerospace field. Documentation from the National Aerospace Initiative (2004) shows the average age of the US aerospace workforce at 49. As many reports and studies affirm, the health of the aerospace workforce is directly connected to America's long-term security interests - both economic and defense. Put simply, USRP is an important contributor in developing NASA's future workforce as well as increasing the size and quality of the overall future aerospace workforce to which NASA and NASA contractors depend. Therefore, USRP internships are an important part of the NASA portfolio of educational projects.

PROJECT ACCOMPLISHMENTS *(CONNECTION BACK TO ANNUAL PERFORMANCE GOALS AND PLANS)*

1. Make competitive USRP internship opportunities available year-round (spring, summer and fall sessions).

The first ever spring USRP internship session included 74 student participants. The summer session included 149 participants (37% increase from 2007) and the fall session included 97 participants (323% increase over 2007).

2. Generate a minimum of 300 student internship experiences.

Overall 12 NASA centers and facilities hosted 319 USRP interns in 2008. This represents an overall increase of 229% from 2007 levels. The majority of that increase occurred in the longer 15-week fall and spring internship sessions where the total number of internships rose from 30 in 2007 to 171 in 2008 – a nearly 6-fold increase.

3. Select a geographically and institutionally diverse group of interns from a wide array of backgrounds, who are fully representative of U. S. undergraduate students enrolled in STEM majors.

In 2008, the 319 USRP student participants represented 204 different academic institutions, 43 states, and Puerto Rico.

- *88% of the participants were upperclassmen (juniors and seniors).*
- *51% were engineering majors, 29% science, and 21% math/computer science.*
- *66% of USRP interns had a GPA above 3.6/4.0.*
- *Of the 319 interns: 20% were minority, 43% were underserved/underrepresented, and 36% were female.*

4. Strengthen evaluation instruments to capture more detailed information on project outcomes.

In 2008 student and mentor surveys were revised to better define the learning outcomes in terms of ABET accreditation criteria, more rigorously define areas of student professional growth, and to more rigorously capture the full value of project return on investment (ROI).

1. USRP student learning in ABET a-k accreditation criteria:

Several questions were added to USRP student surveys to determine whether USRP internship experiences generated growth in several key areas of learning identified by ABET, the Accrediting Body for Engineering Education. These areas are listed below along with the percentage of students who indicated they experienced growth in these areas as a result of their USRP internship experience:

Professional/Technical Communication *(Speaking, writing, presenting, listening and questioning)*	94%
Conceptual/Analytical Ability *(Evaluating situations, solving problems, identifying/suggesting new ideas)*	99%
Learning/Applying Knowledge *(Learning new material, accessing/applying specialized or classroom knowledge)*	97%
Technology *(Using /tools/instruments/information, understanding complex systems and interrelationships)*	95%
Work Culture *(Understanding/working within the group culture, respecting diversity, recognizing implications of actions)*	97%
Organization/Planning *(Managing resources, setting goals, prioritizing, managing multiple tasks and meeting deadlines)*	95%

2. Immediate Return on Investment (ROI) measures:

In 2008 USRP surveys were expanded to include questions designed to capture immediate outcomes normally associated with internship programs. These measures have not been utilized previously for any NASA projects and will be monitored closely in 2009.

A) The overall value of the internship experience to the students:

Students were asked to quantify the value of their USRP internship compared to a typical semester at their college or university. Based on student responses, the total credit hour equivalent of learning generated by USRP in 2008 is 3,700 credit hours. An Internet search for average cost of tuition in 2008 provides a range of dollar values for this ROI measure ranged from $1.8 - $3.3 million.

B) The overall value of the productivity of the interns toward the mission of the NASA mentors:

When asked to compare the productivity of the USRP interns to a typical new hire in their organization, NASA mentors rated the interns, on average, as slightly more productive (1.05). Using an estimated starting salary (including benefits) for recently graduated technical

personnel of $70,000/year, the dollar value of the total ROI productivity of the 319 USRP student interns in 2008 is estimated to be $6 Million.

PROJECT CONTRIBUTIONS TO PART MEASURES (*INCLUDE DATA PLUS EXPLANATION)*

NASA Higher Education Outcome 1.2: Impact on academic and career goals

301 of the 319 USRP interns are still pursuing their undergraduate STEM degrees. Eighteen have actually completed their degree and graduated as of October 1st, 2008. Of those 18, 12 are currently enrolled in STEM related graduate degree programs, 2 are employed in the aerospace field, 1 is employed in a STEM related position, and 2 were seeking STEM-related employment at the time they were surveyed. In other words, 17 of the 18 USRP participants who have graduated have been retained in the STEM educational and career pipeline. This equates to a STEM pipeline retention success ratio of 94% for the USRP project in 2008.

IMPROVEMENTS (*e.g.,* project management, efficiencies, etc.) MADE IN THE PAST YEAR

1. Create 100% web-based application process to encourage more qualified candidates to apply.

Total qualified applicants rose from just under 800 in 2007 to just over 3,000 in 2008. The summer applicant pool nearly tripled to 2,412 candidates, while the fall and spring applicant pools rose by a factor of 6 to just over 600 candidates. Applications represented over 600 academic institutions and came from every state as well as Puerto Rico.

2. Improve efficiencies in selection, offers, and acceptance processes.
Mentor and student survey results indicate that new web-based selection and placement tools and procedures are resulting in a high level of satisfaction in the matching of student interns and NASA mentors. When asked, "was this student intern a good match for your project?", NASA mentors responded with an exceptional rating of 4.79/5.00.

This high level of matching directly leads to high levels of satisfaction in the overall internship experience both from NASA technical mentors and student interns. Student ratings of their overall internship experience averaged a very strong 4.49/5.00. NASA Mentor ratings of intern performance averaged an amazing 4.76/5.00.

PROJECT PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION *(THIS IS WHERE FURTHER FOLLOW-UP TO OCCUR FOR COLLECTING 2008 GRANTEE PERFORMANCE SUMMARIES FOR PUBLISHING TO OUR EDUCATION HOME PAGE)*

This year, USRP has secured partnerships with ESMD, University of Texas Pan American (UTPA and HESTEC), and Universities Space Research Association Council of 102 Space-related Institutions. The goal of these targeted partnerships (and others to follow) is to widen the USRP opportunity dissemination points resulting in a larger, more diverse pool of highly qualified participants.